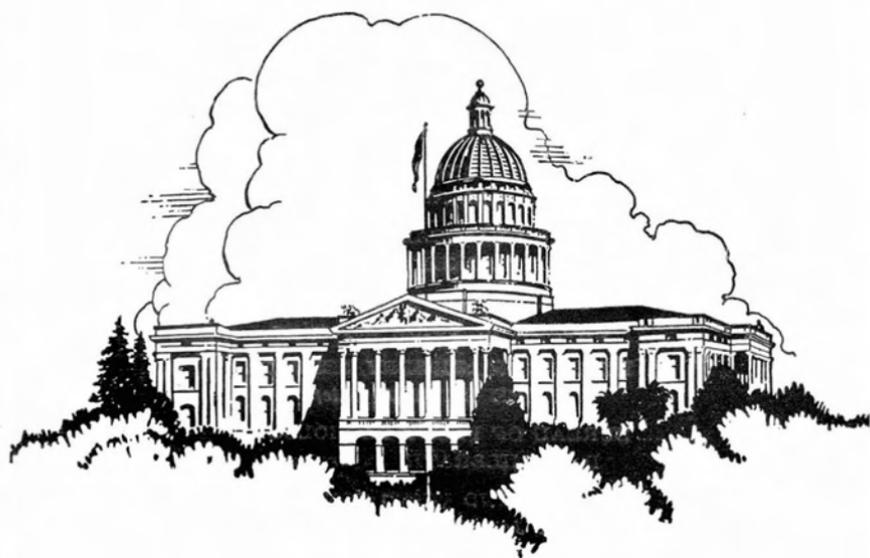


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ERIOPHYID STUDIES

By H. H. KEIFER
State Department of Agriculture

THIS article was begun as a study of Eriophyids taken in connection with the occurrence of Citrus Bud Mite (*Eriophyes sheldoni* Ewing) in the Citrus districts of Southern California. The history of this mite in California began on June 17, 1937, when numerous individuals were observed on ailing lemon trees a few miles west of Santa Paula by J. R. LaFollette of the California Fruit Growers' Exchange and Howard Sheldon of the Limoneira Ranch. For further reference to the damage done by this mite see: Dr. A. M. Boyce and K. E. Maxwell, "The New Citrus Bud Mite", Calif. Citrograph, Vol. 23, No. 3, p. 109, Jan. 1928.

With the discovery of the mite it was necessary to consider its origin, hosts, and distribution. The origin remains unknown unless a Citrus *Eriophyes* record from the Netherland Indies cited in the Review of Applied Entomology, Vol. 24, ser. A, p. 314, May, 1936, gives us a clue. Attempts to discover the mite on non-citrus hosts, especially native plants in the Santa Paula vicinity, only uncovered other species of Eriophyids. The mite is said to occur on orange, but the writer's experience with it is entirely as it is found on lemon.

In order to discover the presence or absence of the mite throughout the citrus-growing counties of Southern California, efforts to survey these counties were immediately begun. The small size of this Acarine (1/138 inch long) makes ordinary insect inspection methods inadequate and it was not until late November that we had a consecutive series of locality records along coastal Southern California. These localities are illustrated on Plate I, the host is lemon, and the data follow:

1. Santa Paula, Ventura County, June 17, 1937, Sheldon and LaFollette.
2. Carpinteria, Santa Barbara County, August 22, 1937, LaFollette.
3. Esccondido, San Diego County, September 4, 1937, Brunton.
4. Fallbrook, San Diego County, September 22, 1937, Kepner.
5. El Cajon, San Diego County, September 22, 1937, La Follette.
6. Oxnard, Ventura County, September 24, 1937, Smith.
7. Goleta, Santa Barbara County, October 18, 1937, Cummings.
8. Bardsdale, Ventura County, November 2, 1937, Smith.
9. Rindge Estate, Los Angeles County, November 10, 1937, Myers and Jones.
10. Tapo, Ventura County, November 16, 1937, Myers and Gammon.
11. Whittier, Los Angeles County, November 19, 1937, Myers.
12. Costa Mesa, Orange County, November 19, 1937, LaFollette.
13. Santa Susana, Ventura County, November 20, 1937, Smith.
14. Puente, Los Angeles County, November 22, 1937, Gallion and Patton.
15. Brea, Orange County, November 24, 1937, Gallion and Patton.
16. Yorba Linda, Orange County, November 24, 1937, Gallion and Patton.
17. Anaheim, Orange County, November 27, 1937, Norland.
18. Orange, Orange County, November 29, 1937, Norland.

In keeping with the usual practice in handling Eriophyid systematics, the burden of proof of the identification and validity of the species herein is laid on the host plant and its reactions. However, it

is hoped that the illustrations will aid in enabling the structural features of these mites to stand on their own merits. The drawings are in some respects unsatisfactory, particularly in the case of the male genitalia of the smaller species, but it is felt that they will serve since they are based on camera lucida proportions. The writer wishes to thank Dr. J. F. Lamiman of Davis for very timely assistance in the microscopical preparation of these mites, E. L. Smith of Santa Paula for sending many specimens of the Citrus Bud Mite, and W. S. Binney of Chula Vista for sending specimens of the Citrus Silver or Rust Mite.

All measurements in the ensuing descriptions are approximations only, and show relative magnitude. The body length is from the front edge or point of the shield to the tip of the caudal lobes. Leg measurements are from the trochanter base, to, but not including the feather-claw. Ring counts begin at the rear edge of the shield. For an explanation of the anatomical designations and seta positions see Hassan, U. C. Pub. in Ent. Vol. 4, No. 11, p. 353, March 22, 1928. The references given under the species are not intended to be complete.

Eriophyes pini (Nalepa)

(Pine Needle Mite)

PLATE III

Nalepa, Sitzungsber. Akad. Wiss. Wien, V. 96, p. 133, 1887

Nalepa, Das Tierreich, 1898, p. 6.

Nalepa, Zoologica, Stuttgart, V. 24, p. 211, 1911.

Walther, Jr. Ec. Ent. V. 18, p. 830, Dec. 1925.

Essig, Ins. Wn. N. Am. p. 48, 1926.

Nalepa, Marcellia, V. 24, p. 70, 1929.

Female length up to 245 microns long, 58 microns wide; light yellow (occasionally a little reddish anteriorly), cylindrical-elongate, often slightly clavate. Rostrum short, bent ventrad, 25 microns long; shield 35.5 microns long, 68 microns wide, rather truncate anteriorly; disc with five longitudinal lines or carinae, the outer two diverging in front of the tubercles, a short seta in the midline just above rostrum; shield side with some granulations; dorsal setiferous tubercles fairly large, 32 microns apart and half way between the front and rear shield edges; dorsal setae 35 microns long, directed forward. Legs rather short and stout. Foreleg 28.5 microns long; patella 5 microns long, tibia 4.5 microns long, patellar seta 20 microns long; tibia with usual dorsal seta and a sublateral appendage; claw 11.5 microns long, tapering, down-curved; featherclaw 7-rayed. Second leg 25 microns long; patella 5 microns long, tibia 3.5 microns long, patellar seta 11 microns long, claw 11 microns long. Anterior coxae apparently well separated; coxal seta III 45 to 50 microns long, these setae in a transverse line with coxal setae II. Abdomen with 70 to 75 rings, some ventrad reduction in their number; rings about 3 microns wide and strongly microtuberculate. A subdorsal seta 10.5 microns long on about ring 9; lateral seta on about ring 8, above and behind the genital seta, 18 microns long. First ventral seta 17 microns long about ring 19-20. Second ventral 10 microns long about ring 35. Third ventral on ring 5 from rear, 28 microns long. Caudal seta not more than $\frac{1}{2}$ body length; accessory seta 9 to 11 microns long. Female genitalia roughly diamond-shaped with short coverflap, 22 microns wide, 16 microns long; seta 7.5 microns long.

Male: 200 microns long, 47.5 microns wide. Male genitalia 20.5 microns wide, 15 microns long; the seta about 6 microns long.

Specimens of this mite are on hand from: Torrey Pines, San Diego County, November 7, 1937, host *Pinus torreyana* Parry, collected by M. L. Jones; San Francisco, August 31, 1937, host *Pinus radiata* Don, collected by the writer; Sacramento, various dates, hosts *P. torreyana* and *P. sabiniana* Dougl., collected by the writer. The mites figured are from Sacramento Torrey Pine where they are very easily collected. They are usually found inside the sheaths of the youngest needles, between the sheath and the needle, though they also are found between the needles. The females overwinter, producing males early in the spring. No particular damage has been noted although the damage

this mite does on occasion is well known. Recognition characters of the mite are its size, since it is one of our larger species, with its elongate-cylindrical, almost uncurved form, forward-directed shield setae, small frontal seta on shield, the extra pair of subdorsal setae behind the shield, 7-rayed featherclaw, and unfurrowed or unlined shortened coverflap on the female genitalia.

Judging from the data given in *Zoologica*, *E. piri* as we know it is not precisely like the varieties occurring in Europe. The one on European pine is said to have smooth sides to the shield. Our mites have more or less distinct granules laterally and an atypical discal carination. *Eriophyes piri*, *quadrisetus* (F. Thom.) and *avellanae* Nal. are notable in possessing one or two extra setae on the shield, the extra pair of subdorsal setae on the proximal part of the abdomen, and, if figures give the correct impression, similar female genitalia. Certainly the female genitalia of *piri* are quite different from those on the bulk of species referred to *Eriophyes*.

***Eriophyes piri* (Pag.)**

(Pear Leaf Blister Mite)

PLATE II, Fig. 5, Pl. IV

Pagenstecher, Vehr. Ver. Heidelberg, V. 1, p. 48, 1857.

Nalepa, Sitzungsber. Akad. Wiss. Wien, V. 99, p. 50, 1890.

Nalepa, *Zoologica*, Stuttgart, V. 61, p. 234, 1911.

Nalepa, Marcellia, V. 22, p. 62, et seq. 1925.

Essig, Ins. Wn. N. Am. p. 44, 1926

Nalepa, Marcellia, V. 25, p. 104, 1929.

Female eight yellow, wormlike, somewhat curved, up to 230 microns long, most specimens about 200 microns long, 40 to 50 microns wide. Rostrum 24 microns long, directed forward and a little bent down. Shield 26 to 28.5 microns long by 28.5 microns wide, gently curved above, rather truncate anteriorly; design of three principal central lines in disc, a somewhat broken curved lateral line, side with rows of granules; dorsal tubercles 12 microns apart, seta a little ahead of the rear edge, the seta 20 to 22 microns long and directed forward. Legs moderately stout; foreleg 26 to 28 microns long; patella 5 microns long; tibia 5.5 microns long; patellar seta 17-19 microns long; claw 7 microns long, gently bent down and slightly knobbed; featherclaw 4-rayed. Hindleg 26 to 28 microns long, patella 5 microns long, tibia 5.5 microns long, patellar seta about 7 to 8 microns long, claw 8 microns long. Sternal ridge indistinctly forked; seta of second coxa 34 microns long. Abdomen with 90 to 95 rings, considerable ventrad reduction. Lateral seta on ring 7, above genital seta, 14 microns long. First ventral seta 14 microns long, about ring 21. Second ventral 4 microns long about ring 42. Third ventral 8 rings from rear, 16 microns long. Caudal seta nearly 40 microns long; accessory seta 5 to 6 microns long. Female genitalia 21.5 microns wide, 10.5 microns long; bowl-shaped, coverflap longitudinally furrowed, gland short-stalked, seta 4.5 microns long.

Male 150 to 165 microns long, 38 to 40 microns wide, genitalia 16 microns wide, 10 microns long, the seta 9.5 microns long.

Specimens are on hand principally from Sacramento pear where the mite is common and can be collected in the leaf blisters during the summer and the terminal buds during the winter. Males do not appear in collections taken from fall leaf blisters, or in wintering buds, but are found in the spring generation appearing in the swelling buds (March 19). The drawings are from late fall mites. Recognition characters are: shape and size, number of body rings; shield design with forward-directed setae; 4-rayed featherclaw.

This is a little different in size from the mite described by Nalepa in Marcellia V. 22, p. 63-64. However, it presumably is *Eriophyes piri typicus* (Pagst) Nal., since the host, host reaction, and general structural features of the mite are fairly consistent with "typicus." Certain individuals of *E. piri* on pear in California seem to show a certain

habit difference, either temporary or permanent, from the typical blister or leafpocket type of life history. These mites do not form summer blisters, but microscopic examination fails to show tangible structural differences. The whole question of *E. piri* should be studied to explain the taxonomic significance of its occurrence on pear, apple, *Sorbus*, and possibly other hosts in California. Such a study would correlate our mites with the elaborate nomenclature proposed by Nalepa for European mites of this complex.

***Eriophyes tristriatus erineus* (Nal.)**

(Walnut Erinose Mite)

PLATE II, Fig. 4, PLATE V

Nalepa, Anz. Akad. Wien, V. 28, p. 162, 1891.

Nalepa, Das Tierreich, p. 11, 1898.

Nalepa, Zoologica, V. 61, p. 219, 1911.

Essig, Ins. Wn. N. Am. p. 47, 1926.

Nalepa, Marcellia, V. 25, p. 74, 1929.

Female light yellow, up to 240 microns long, 37 microns wide, wormlike, elongate, little curved. Rostrum 6.5 microns long, projecting forward and down. Shield subtriangular, gently curved above, 23 microns long by 23 microns wide, surface smooth except for slight indication of three lines between dorsal tubercles and a few large side granulations; dorsal tubercles on rear margin, 17 microns apart, the seta 17 microns long and retrorse. Legs rather short and stout. Foreleg 25 microns long, the patella 4.5 microns long, tibia 4 microns long, patellar seta 16 microns long; tarsus 6.5 microns long, gently curved; featherclaw 3-rayed. Second leg 22.5 microns long, patella 4.5 microns long; tibia 4 microns long; tarsus 5.5 microns long, the patellar seta 8 microns long. Anterior coxae contiguous to the sternal line simple; seta of second coxa 27 microns long. Abdomen with 50 to 60 rings, a little ventrad reduction in ring number, the rings 3 microns wide and heavily microtuberculate; the microtubercles fade on the last 4 or 5 rings. Lateral seta about ring 5, a little behind genital seta, 7 microns long. First ventral seta 7 microns long about ring 16. Second ventral 5 microns long on ring 29. Third ventral 9 microns long about 5 rings from rear. Caudal seta about 60 microns long; accessory seta 7 microns long. Female genitalia somewhat lenticular, coverflap smooth; 14.5 microns wide, 9.5 microns long; glands small, short-stalked; seta 3 to 4 microns long.

Male not studied.

This mite can be collected on *Juglans regia* L. in many parts of California during most of the year. In the summer it produces the well-known leaf erineum and in the fall migrates to the buds. The drawings were made from Sacramento specimens collected from walnut buds November 29, 1937. Mites collected near Santa Paula, July 27-28, 1937, were all in English walnut buds, no erineum being observed. A single individual of this mite was found on a pepper tree (*Schinus molle* Linn.) at Santa Paula, July 28, 1937. Later in the season the species caused same confusion in the Citrus Bud Mite survey by being found in lemon buds. All mites of this subspecies on trees other than walnut are, however, wanderers and do not represent established infestations.

Recognition characters of the mite are: body form and rings; smooth shield; 3-rayed featherclaw; shape of female genitalia and smooth coverflap.

***Eriophyes convolvens* (Nal.)**

PLATE VI

Nalepa, Anz. Akad. Wien, V. 26, p. 162, 1889.

Nalepa, Das Tierreich, p. 20, 1898.

Nalepa, Zoologica, V. 61, p. 230, 1911.

Nalepa, Marcellia, V. 25, p. 123, 1929.

Female light brown, robust, conical, curved; length about 110 to 115 microns, width 42 microns. Rostrum 23.5 microns long, downcurved. Shield 33 microns

broad, 26 microns long, little curved dorsally, shortened anteriorly; shield design indistinct, 3 main longitudinal lines in disc with curved lines or lines of dots and granules laterally; dorsal tubercles moderately large, set anterior to the rear edge, 16.5 microns apart, the setae 16 microns long and directed dorsocentrad. Legs moderately slender. Foreleg 28.5 microns long, the patella 5.5 microns long, tibia 8 microns long; patellar seta 26 microns long; claw strongly downcurved, slightly knobbed, about 6 microns long; featherclaw 5-rayed. Second leg 28 microns long, patella 5 microns long, tibia 6.5 microns long, patellar seta 7.5 microns long; the claw 6.5 microns long. Sternal line not forked; seta of second coxa 35 microns long. Abdomen widest just behind shield and strongly tapering, 65 to 75 rings, some ventrad reduction; rings about 1.5 microns wide with microtubercles touching the rear edge of the rings; the last few abdominal rings with longitudinal striations, those on the ventral side of the last ring especially conspicuous. Lateral seta 23 microns long, above genital seta or a little behind and on about ring 8. First ventral seta 35 microns long, about ring 20. Second ventral 8 microns long, on ring 36. Third ventral 20 to 21 microns long, 8-9 rings from rear. Caudal seta nearly 50 microns long; accessory seta about 2 microns long. Female genitalia subcordate, flap longitudinally furrowed; length 12 microns, width 21 microns; the seta 5 microns long.

Male not seen.

Specimens from *Euonymus* sp. twigs from Ventura lath house, October 27, 1937, collected by E. L. Smith. The mites were stunting the tips and deforming the leaves. Recognition characters: *Phyllocoptes*-like body form; short dorsocentrad directed dorsal shield setae.

Eriophyes tulipae Keifer, n. sp.

PLATE VII

Female spindle-form, a little curved, whitish, 210-250 microns long, 50 to 65 microns wide. Rostrum 28 microns long, gently bent down. Shield but little curved above, subtriangular, slightly overlying the rostrum base, 39 microns long by 36 microns wide; design clear and in disc basically of five diverging lines, the shield sides with curved lines and band of granulations above edge; dorsal tubercles moderate in size on rear margin, 23 microns apart, the setae projecting backward over 60 microns long. Legs moderately long and slender. Forelegs 40.5 microns long; patella 8 microns long, tibia 9 microns long; patellar seta 28.5 microns long; claw rather strongly downcurved, slender, about 10 microns long; featherclaw 7-rayed. Hindleg 36 microns long; patella 8 microns long, tibia 8 microns long, patellar seta 14 microns long, claw 11 microns long. Anterior coxae touching, sternal ridge forked; coxae and suboral plate minutely granulate; seta of second coxa 40 microns long. Abdomen with 85 to 90 rings, some ventrad reduction in number; rings about 2 microns wide, the microtubercles partly resting on rear edge of each ring; last 5 or 6 rings with microstriations. Lateral seta on about ring 10, above genital seta, 35.5 microns long. First ventral seta about ring 27, and 54 microns long. Second ventral 35 or more microns long and on ring 50. Third ventral 31 microns long, 5 or 6 from rear. Caudal seta about 80 microns long; accessory seta 4.5 microns long. Female genitalia 24 microns wide, 17.5 microns long, subcordate, coverflap longitudinally furrowed, seta 12 microns long.

Male not discovered.

Type slide so designated and with specimens collected from tulip bulbs in Sacramento, October 4, 1937, by W. B. Carter. The bulbs are said to have originated in Holland. Paratype slides three in number are also designated with same data. The mite feeds between the bulb layers, scarifying and drying the surfaces. No *Eriophyid* is listed by Nalepa 1929 (*Marcellia* V. 25, p. 67), as occurring on any Liliaceous plant. Recognition characters are elongate white body, strongly carinated shield, long setae, 7-rayed featherclaw.

Eriophyes cactorum Keifer, n. sp.

PLATE VIII

Female rather thick, spindle-form, pink, a little curved, length 210 to 220 microns, width 52.5 microns. Rostrum 33 microns long, strongly bent down. Shield 33 microns long, gently curved above, 48 microns wide, subtriangular; shield design quite distinct, disc of five diverging longitudinal lines, some granulations to rear, shield sides with short lines and a granular area along rim; dorsal tubercles moderate in size on rear margin, 35 microns apart, the setae projecting backward and 30 microns long. Legs moderately slender. Foreleg 35 microns long; patella 7 microns long, tibia 8 microns long; patellar seta 24 microns long; claw gently downcurved tapering, distinctly knobbed, 10 microns long; featherclaw 5-rayed. Hindleg 33.5 microns long, patella 6 microns long; tibia 6.5 microns long; patellar seta 14 microns long, claw 11 microns long. Anterior coxae contiguous, the sternal line forked; seta

of second coxa 59 microns long. Abdomen with about 65 rings, each ring about 2 microns wide and strongly microtuberculate, the microtubercles situated principally on the rear rim of each ring; dorsally the abdomen is increasingly serrate to 5 or 6 rings of the rear when it noticeably flattens out. Lateral seta on ring 11, above genital seta, 28 microns long. First ventral seta 70 microns long, about ring 23. Second ventral 8.5 microns long, on ring 38. Third ventral 7 rings from rear, 24 microns long. Caudal seta 210 microns long; accessory seta 6 microns long. Female genitalia 29 microns wide, 17 microns long, shallow bowlshaped, coverflap longitudinally furrowed, the furrows divided or interrupted across the middle; glands large, oval, short-stalked; seta 12 microns long.

Male 180 microns long by 65 microns wide; genitalia 16.5 microns wide, 16 microns long, seta 11 microns long.

Type slide so designated and of specimens collected July 28, 1937, on *Opuntia* sp. near Santa Paula by the writer. Six paratype slides so designated, collected at the same locality, July 27, 28, and 29, 1937. The mites were found in the flowers and among the papillae of small pads. No damage was noted. No Eriophyid is listed by Nalepa from the Cactaceae. Recognition characters: rather large, pink body; shield design, body microtuberculation and scoring of the coverflap.

Eriophyes sheldoni Ewing

(Citrus Bud Mite)

PLATE II, Fig. 1, PLATE IX, X

Klein, Cal. Cult. Vol. 84, p. 537, July, 1937 (Lemon Mystery Solved).

Ewing, Proc. Ent. Soc. Wash, V. 29, p. 193, Oct. 1937.

Boyce and Maxwell, Calif. Citrograph, Vol. 23, No. 3, p. 106, Jan. 1938.

Female spindle-form, yellow to orange in color, 170 to 180 microns long, 35 to 42 microns wide. Rostrum 21 microns long, projecting down. Shield gently curved above, 23 microns long, 21 microns wide; design usually indistinct in disc, of three principal longitudinal lines, the central broken and anchor-shaped caudad, the sides of the disc with curved lines or lines of dots, side of shield with curved lines and band of granulations along rim; dorsal tubercles 17 microns apart, on rear rim, the seta 16 microns long and projecting backward. Legs of moderate length. Foreleg 24 microns long, patella 4.5 microns long, tibia 5.5 microns long, patellar seta 18 microns long; claw gently bent down, knobbed, 4.5 microns long, featherclaw 5-rayed. Hindlegs 21.5 microns long; patella 4 microns long, tibia 4.5 microns long, patellar seta 9 microns long; claw 5.5 microns long. Sternum indistinctly forked; seta of second coxa 29 microns long. Abdomen with about 65 to 70 rings, considerable ventrad reduction in ring number in some individuals; the rings 2 microns wide, strongly microtuberculate, the microtubercles about touching the rear rim of the rings; the last several rings microstriate. Lateral seta 19 microns long, above and behind genital seta, about ring 8-10. First ventral seta 30 microns long, on about ring 23-25. Second ventral 8.5 microns long, about ring 34-37. Third ventral 16.5 microns long, 5 or 6 rings from rear. Caudal seta 40 to 45 microns long, accessory seta 3.5 microns long. Female genitalia subcordate, 12 microns long, 19 microns wide, coverflap longitudinally furrowed, 8-10 furrows; glands oval, short-stalked; seta 10.5 microns long.

Male 120 to 130 microns long, 27.5 microns wide. Genitalia 11 microns long, 13.5 microns wide; seta 7 microns long.

Numerous individuals are on hand from localities listed at the beginning of this article. They are mostly from under lemon buttons, but some have been taken in buds. Browning of the lemon skin under the buttons and partial bud blasting can be definitely laid to this Eriophyid. The Santa Paula specimens which are in the type locality show a considerable reduction in ring number from the dorsal to the ventral sides. They also as a rule do not show so distinct a shield pattern as the Orange County individuals. The shield pattern seems rather variable throughout the range of the mite. Male specimens can be collected in July but seem to become quite scarce soon thereafter. The figures on Plate IX are from Santa Paula specimens; those on Plate X are from Anaheim specimens. That the mite has been in California for some time is indicated by the relatively wide range of the species in California. Whether or not we can infer anything

of the ecology of this mite from the present apparent coastal distribution is yet to be investigated. Recognition characters: size, shield design, 5-rayed featherclaw, host. This is one of the smaller Eriophyids to be met with in California.

Eriophyes spinulifera Keifer n. sp.

PLATE XI

Female 175 to 185 microns long, 47 microns wide, yellow, conical, a little curved. Rostrum about 28 microns long, projecting diagonally down. Shield subtriangular, 35 microns long, 45 microns wide, gently arched above; design of five more or less complete longitudinal lines in the disc, the two addorsals complete, the side of the shield with some curved lines and sparse granulations, dorsal tubercles on rear shield rim, 28.5 microns apart, the seta 29 microns long, projecting backwards. Legs moderately short and stout. Foreleg 26 to 28 microns long; patella 4.5 microns long; tibia 5 microns long; patella seta 26 microns long; claw rather long, prominent, bent down, knobbed, about 10.5 microns long; featherclaw 5-rayed. Hind leg 23 to 25 microns long; patella 4 microns long, tibia 4.5 microns long, patellar seta 11 microns long; claw 9 microns long. Anterior coxae contiguous the sternal line simple; seta of second coxa 33 microns long. Abdomen with 50 to 55 rings, some ventrad reduction; rings about 2.3 microns wide with prominent microtubercles; each microtubercle extended into an erect or semi-erect short spinule. Lateral seta to rear of genital seta, 19 microns long on about ring 9. First ventral seta about 48 microns long on the 18th ring. Second ventral seta 9.5 microns long, on about the 29th ring. Third ventral 20 microns long on the fifth ring from rear. Caudal seta about 50 microns long; accessory seta 7 microns long. Female genitalia rather shallow bowl-shaped, flap longitudinally furrowed, glands small, short-stalked; the genitalia 26 microns wide, 14 microns long; seta 12 microns long.

Male not seen.

Type slide so designated; of specimens collected at Puente, California, December 14, 1937, in Cecidomyid galls on *Artemisia californica* Less. by L. E. Myers. Paratypical slides three in number, so designated, with same data. The specimens as collected were obviously overwintering. Recognition characters are: body shape; shield design; featherclaw and especially the barbed or spine-bearing microtubercles. The so far monotypic genus *Trichostigma* Gerber is characterized by a velvety or wooly mite. The present species is in no sense velvety in appearance. Further discussion of this mite will be found under the new *Phyllocoptes* from *Citrus*.

Eriophyes neosalviae Keifer n. sp.

PLATE XII

Female rather wormlike, curved, light yellow, 140 microns long, 32 microns wide. Rostrum rather bulging anteriorly, bent down, 27 microns long, 32 microns long, 28 microns wide, slightly curved above, subtriangular, disc with five longitudinal diverging slightly recurved lines, sides with 2 or 3 diagonal lines, almost entirely granulated; dorsal tubercles moderate size, on rear shield rim 17 to 19 microns apart, the setae projecting backwards and 25 microns long. Legs moderately slender. Foreleg 27 microns long; patella 4 microns long, tibia 4.5 microns long, patellar seta 20 microns long; claw prominent, long, bent down just above middle, 11.5 microns long; featherclaw 4-rayed. Second leg 23 microns long; patella 3 microns long, tibia 3.5 microns long, patellar seta 8.5 microns long; claw 11.5 microns long. Anterior coxae contiguous centrally, the sternal line forked; coxal seta I near anterior margin of coxae, seta II before end of sternum, seta III 38 microns long. Abdomen with 60 to 65 rings about 1.3 microns wide, strongly microtuberculate, the microtubercles touching the rear rim of the rings. Lateral seta 7 microns long about ring 7, above the genital seta. First ventral seta 31.5 microns long on ring 19. Second ventral 7.5 microns long on ring 34. Third ventral 15 microns long 6 rigs from rear. Caudal seta about 50 microns long; accessory seta 3.5 microns long. Female genitalia rather broad bowl-shaped, emarginate posteriorly, coverflap with about 8 longitudinal furrows; glands globular, short-stalked; seta 8.5 microns long; the genitalia 20 microns wide, 11.5 microns long.

Male 123 microns long, 26.5 microns wide. Male genitalia 8.5 microns long, 13 microns wide, the seta 8.5 microns long.

Type slide, so designated, containing mites collected from *Salvia leucophylla* Greene near Santa Paula, July 28, 1937, by the writer. Paratype slides, so designated, bearing the same data. The mites were

collected from the petiole bases of yellowing leaves, these leaves usually being the older members of each whorl. No leaf deformation, erineum or other deformation was observed on these plants. This mite fits in with the species described in Europe as infesting various Labiateae, but descriptions and figures indicate it to be distinct. *Eriophyes salvia* (Nal.) differs in lacking the side granulations on the shield, in the length of the dorsal setae, its effect on the host, etc. Recognition characters of *neosalviae*; granular sides of shield; prominent angled claws.

Eriophyes eriobotryae Keifer n. sp.

PLATE XIII

Female light yellow, vermiform, somewhat curved, 190 microns long, 35 microns wide. Rostrum 23.5 microns long, projecting down. Shield rather declivitous above, somewhat rounded 21.5 microns long, 32 microns wide; the design of rows of dots or dashes: three principal longitudinal lines in center of disc, covering caudad, an outer curved line on each side anteriorly a little more than half shield length, the disc bordered laterally by a curved converging line; shield sides granular; dorsal tubercles moderately large, 22.5 microns apart, on rear margin, the setae projecting backwards and 23 microns long. Legs moderately stout. Foreleg 25.5 microns long; patella 4.5 microns long, tibia 5 microns long, patellar seta 14.5 microns long; claw gently downcurved 6 microns long; featherclaw 5-rayed. Hindlegs 22 microns long; patella 4 microns long; tibia 4.5 microns long, patellar seta 7 microns long; claw 6.8 microns long. Sternum forked; coxal setae I wider apart than setae II; setae II at base of sternal fork; seta III 24.5 microns long. Abdomen with 90 to 95 rings, some ventrad reduction, the rings 1.5 microns wide; microtubercles touching rear edge of rings; caudally the microtubercles become microstriations. Lateral seta above genital seta, 4.5 microns long, on ring 10. First ventral seta 19 microns long, about ring 28. Second ventral 3.7 microns long, about ring 55. Third ventral on 5-6 rings from rear, 8 microns long. Caudal seta 28 to 30 microns long; accessory seta 4 microns long. Female genitalia 11.5 microns long, 20.5 microns wide; bowl-shaped, coverflap with 11 to 14 furrows, glands round and moderately short-stalked; seta 4 microns long.

Male 110 microns long, 30 to 33 microns wide. Male genitalia 14 microns wide, 12 microns long, genital seta 9.5 microns long.

Type slide, so designated, of mites collected March 18, 1938, on Sacramento loquat (*Eriobotrya japonica* Lindl.) by the writer. Paratype slides, so designated, one with same data as type, three with mites collected in Sacramento on December 15, 1937. The mites were found in the buds. No damage was noted. As with other mites, the males are absent in the fall but appear in the early spring. No mite has been described from *Eriobotrya*. Recognition characters: Aside from the host, the type of shield design is likely the most distinctive feature.

Platyphytoptus Keifer, new genus

Legs six-jointed; featherclaw simple; anterior coxae separated. Body flattened dorsoventrally; shield and abdomen bearing no unusual setae, the dorsal setiferous tubercles considerably anterior to the rear edge of the shield; abdomen with same number of rings on both dorsal and ventral sides, superficially divided into a tergum and sternum by a sublateral groove on each side, this groove from just above the genitalia, running caudad and fading out ahead of ventral seta III; rings generally microtuberculate except possibly the sides, the ventral microtubercles larger. Female genitalia with a short granular coverflap.

Genotype as follows:

Platyphytoptus sabinianae Keifer, new sp.

PLATE XIV

Female up to 215 microns long, 64 microns wide, 30.5 microns deep; color pinkish or red-brown; body in dorsal view heavy spindle-form, widest across rear of shield, dorsoventrally flattened, a little curved. Rostrum 26 microns broad at base, 40 microns long, projecting forward and downcurved at apex. Shield 55 microns wide, 40.5 microns long, roughly a heavy T-shape, the anterior margin transversely sinuate-truncate with apparently a flap over the rostrum base; the shield without markings except rather sparse micro-granulations and short longitudinal lines along the setiferous tubercles; tubercles large, considerably anterior to rear margin, 22.5 microns apart, the setae 10 to 11 microns long and directed

dorsocentrad. Legs moderately stout, projecting anteriorly. Foreleg 36 microns long; patella 6 microns long, tibia 6 microns long patellar seta 28.5 microns long; claw 10 microns long, downcurved, slightly knobbed; a short spine on underside of tarsus; featherclaw 5-rayed. Hindleg 33.5 microns long; patella 5.5 microns long, tibia 5.5 microns long, patellar seta 14.5 microns long; claw 10 microns long. Anterior coxae 7 microns apart, the whole sternal area and coxae irrorated with granules; setae I and II equally far apart; seta III 40 microns long. Abdomen with about 66 rings, the furrows as described; dorsal half-rings nearly 3 microns wide, the ventral half-rings about 2.5 microns wide, more heavily microtuberculate ventrally than dorsally. Lateral seta considerably anterior to the genital seta, in furrow, 14 microns long and on ring 3 to 5. First ventral seta just below furrow, 19 microns long, on ring 15 to 17. Second ventral 20 microns long, about ring 33. Third ventral 19 microns long, 7 rings from rear. Caudal seta, about 75 microns long; accessory seta 4.5 microns long. Female genitalia 26 microns wide, 19 microns long, bowl-shaped or semicircular; coverflap short, appressed, granular; glands small, triangular, short-stalked; seta 11 microns long.

Male unknown.

Type slide, so designated of mites collected at Oroville, California, January 23, 1938, on *Pinus sabiniana* Dougl. (Digger Pine) by the writer, from which specimens the drawings were made. A paratype slide from same locality, date and host. Three paratype slides from Folsom Digger Pine, October 12, 1937, collected by Walter Travioli at the writer's request. One paratype slide from Folsom Digger Pine, April 3, 1938, collected by the writer. There are also specimens from Woodland, November 10, 1937, *Pinus radiata* Don., J. B. Steinweden, collector; Bear Mountain, Kern County, December 8, 1937, *Pinus sabiniana*, M. L. Jones collector; Sacramento, October 7, 1937, *Pinus sabiniana*, February 9, 1938, *Pinus pinea* L., and March 21, 1938, *Pinus torreyana* Parry, these latter collections by the writer. In Sacramento the mite was collected with *Eriophyes pini*, but at Oroville, Folsom, and Bear Mountain no *E. pini* occurred with *Platyphytoptus sabinianae*. The mites are found more frequently between the needles than between needle and sheath, their flattened form enabling them to take this position. No injury has been noted except perhaps a scarifying of the needle bases.

The necessity for the erection of a new genus for this mite is clearly indicated after an examination of Nalepa's arrangement of Eriophyid genera in Marcellia, Vol. 24, p. 27, 1927. No genus in either subfamily bears sublateral abdominal furrows. *Platyphytoptus sabinianae* is here placed in the Eriophyinae because the number of tergites and sternites are approximately equal, though divided sharply into their respective areas along most of the abdominal length. Following Nalepa, then we have this generic arrangement:

- | | |
|--|--------------------------------|
| 1. Abdomen lacking furrows..... | 2 |
| 1. Abdomen with dorsal or sublateral furrows..... | 3 |
| 2. Abdomen with narrow rings, microtuberculate or the dorsal side smooth; generally three pairs of ventral bristles..... | <i>Eriophyes</i> Sieb. |
| 2. Abdomen with broad rings, smooth; first and second pairs of ventral setae missing..... | <i>Cecidodectes</i> Nal. |
| 2. Abdomen microtuberculate, the microtubercules each bearing 1 or 2 erect or recumbent little hairs..... | <i>Trichostigma</i> Gerber. |
| 3. Abdomen with a median dorsal longitudinal furrow..... | <i>Monochetus</i> Nal. |
| 3. Abdomen with several dorsal longitudinal furrows..... | <i>Phytoptochetus</i> Nal. |
| 3. Abdomen with dorsum evenly transversely arched and a sublateral longitudinal furrow on each side..... | <i>Platyphytoptus</i> new gen. |

"*Platyphytoptus*" *jonesi* Keifer, new sp.

PLATE XV

Female reddish anteriorly, the remainder yellow; body clavate, somewhat dorsoventrally flattened; length 250 to 336 microns, greatest width 80 microns. Rostrum 42.5 microns long, 33 microns wide, strongly bent down. Shield roughly

V-shaped in dorsal view with a broad base and transverse-sinuate foremargin; rather flattened in side view; 47.5 microns long, 55 microns wide; surface practically smooth with an indistinct line or two and fine sparse granulations; tubercles moderately large, 35.5 microns apart, about half way between rear and hind margins, the setae 53 microns long, strong, directed forward; a frontal seta just behind rostrum, prominent, 18 microns long. Legs moderately long and strong. Foreleg 52 microns long; patella 8 microns long, patellar seta 38 microns long, tibia 8.5 microns long; tibia with a lateral seta from the lower outside angle; claw 16.5 microns long, curved down, knobbed; featherclaw 10-rayed. Second leg 50 microns long; patella and tibia 8 microns long each, patellar seta 23 microns long; claw 17.5 microns long. Anterior coxae contiguous, sternum indistinct, the whole sternal area finely spinulate; coxal setae I slightly further apart than II; coxal setae III 47 microns long. Abdomen with 70 to 80 rings and a shallow sublateral longitudinal furrow from above genitalia fading out well before ventral setae III; the rings show a slight ventrad increase in the furrow, are about 3 microns wide; micro-tubercles heavier ventrally than dorsally, being mainly situated on the rear rim of each ring especially on the dorsal side; last 5 or 6 rings microstriate. Lateral seta on ring 3-4, well ahead of the genital seta, 28.5 microns long. First ventral seta on ring 18, about 71.5 microns long. Second ventral 21 microns long, on ring 32. Third ventral 33 microns long, about 5 rings from rear. Caudal seta 140 microns long; accessory seta 9.5 microns long. Female genitalia bowl-form, coverflap apparently absent; glands very long-stalked, the genitalia 29 microns wide, 23 microns long; seta 23 microns long.

Male 240 to 250 microns long, 63 microns wide. Male genitalia 30 microns wide, 26 microns long, seta 14 microns long.

Type slide, so designated, with mites collected at Torrey Pines, San Diego County, California, November 9, 1937, from *Pinus torreyana* Parry by Meredith L. Jones. I take pleasure in naming this large mite for Mr. Jones who has brought me many specimens of mites and insects. Paratype slides, so designated, same data, five in number. The mite was found on the Torrey Pines usually between the needles. No damage was observed.

This species is provisionally placed in *Platyphytoptus* since it has a sublateral abdominal furrow and because the erection of a new genus for it would necessitate the use of characters not employed by Nalepa. The frontal seta which is apparently an unusual feature in Eriophyids is also present in such species as *Eriophyes pini* but this was not used to separate these from the others now placed in *Eriophyes*. Our present species is not congeneric with *pini*, which calls this frontal seta to our attention again. The body shape, frontal seta, shape of shield and direction of dorsal setae, contiguous forecoxae, and female genitalia, sharply separate *jonesi* from *sabinianae*.

Phyllocoptes ligustri Keifer n. sp.

PLATE XVI

Female light brown, curved spindle-form, 168 to 190 microns long, 53 to 55 microns wide, 48 to 50 microns thick. Rostrum projecting down. Shield 51 to 53 microns wide, 47 to 49 microns long, subtriangular, produced anteriorly over rostrum; design quite indistinct, of three more or less modified longitudinal lines in disc, and fine lines laterally; dorsal tubercles about 35 microns apart, moderate size, near rear margin, the setae 14 to 17 microns long and projecting caudad. Legs moderately slender. Foreleg 36 to 38.5 microns long; patella 6 microns long, patellar seta 26 microns long; tibia 9.5 to 11 microns long; claw gently curved, strongly knobbed, 6.8 to 9 microns long; featherclaw 4-rayed. Hindleg 35 to 37 microns long; patella 5.5 microns long; patellar seta 11 microns long; tibia 8 to 8.5 microns long; claw 6.8 to 9 microns long. Sternum forked; first coxal setae below anterior end of sternum; second coxal opposite sternum fork; third coxal 40 microns long. Abdomen with about 36 dorsal half-rings, smooth or nearly smooth, 4.5 microns wide; ventral half-rings about 66 in number, strongly microtuberculate. Lateral seta 36 to 38 microns long, about ring 9, a little anterior to genital seta. First ventral seta 57 to 60 microns long, on ring 23 to 24. Second ventral 20 to 22 microns long, on ring 43. Third ventral 31 to 33 microns long, 5-6 rings from rear. Caudal seta 85 to 90 microns long; accessory seta minute, 2 microns long. Female genitalia shallow bowl-shaped, 24 microns wide, 13.5 microns long; coverflap with 8 or 9 furrows, glands apparently narrow, curved; seta 32 microns long.

Male not seen.

Type slide with mites collected at Pasadena, California, March 4, 1938, by Cyril Gammon on privet (*Ligustrum* sp.). Four paratype

slides and vial with further paratypes, bearing same date. This mite causes browning or scarification of the leaf surface. No mite has heretofore been listed from privet.

The genus *Phyllocoptes* was first proposed by Nalepa in the *Sitzungsber. Akad. Wiss. Wien*, Vol. 98, pp. 116, and 148, 1889. The first species mentioned under *Phyllocoptes* is *carpini* Nal. pp. 117 and 148. For the purpose of this article then, we can consider *carpini* as the genotype of *Phyllocoptes*. The species described above as *ligustri* is, with the exception of the shield tubercles and setal direction, quite similar to *carpini* in generic characters, having a well-produced shield, smooth or nearly smooth tergites, the tergites somewhat laterally overhanging the sternites, the sternites for the most of the abdominal length about twice or more the number of tergites, and heavily microtuberculate. The remainder of the *Phyllocoptes* species here treated vary in shield shape, or microtuberculation, or in the numerical relation of the tergites to the sternites, from the *carpini* concept of *Phyllocoptes*.

Phyllocoptes toxicophagus Ewing

PLATE XVII

Ewing, Proc. Iowa Acad. Sci. V. 24, p. 323, 1917.

Nalepa, Marcellia, Vol. 25, p. 124, 1929.

Female light brown, 145-155 microns long, 44 microns wide, curved spindle-form, cylindrical or a little flattened. Rostrum projecting down, 21.5 microns long. Shield 42 microns wide, about 33 microns long, subtriangular, the anterior a little produced and overhanging rostrum base to that extent; design of disc indistinct, of two main longitudinal lines, curving together, toward rear, and flanked by curved lines; the shield side of curved lines or lines of granulations; dorsal tubercles moderate in size, set on rear shield rim, 30 microns apart, the seta being about 13 to 15 microns long and extended caudad. Legs rather slendered. Foreleg 28 to 29 microns long; patella 5.5 microns long, tibia 7 microns long, patellar seta 22 microns long; claw 6.5 microns long, gently curved, tapering, knobbed; featherclaw 4-rayed. Second leg 27 microns long; patella 4 microns long, tibia 5.5 microns long, patellar seta 13 microns long, claw 8.5 microns long. Anterior coxae contiguous the sternal line forked; coxal setae I below anterior end of sternal line; coxal setae II closer and behind sternal fork; coxal setae III 28 microns long. Abdomen with about 43 dorsal half-rings or tergites and about 65 ventral half-rings or sternites; the dorsal half-rings 3 microns broad and usually prominently microtuberculate, but not always; the ventral half-rings have closer more definite but smaller microtubercles; the last few abdominal rings are microstriate. Lateral seta above genital seta, on ventral half-ring 10, and 18 microns long. First ventral seta 40 microns long, about ring 22. Second ventral 14 microns long, about on ring 40. Third ventral seta 15 microns long, 7 rings from rear. Caudal seta fine, about 50 microns long; accessory seta present. Female genitalia bowl-shaped, sometimes a little indented behind, 21.5 microns wide, 11.5 microns long; coverflap longitudinally furrowed; glands round, moderately short-stalked; seta 14.5 microns long.

Male 120 to 130 microns long, 38 microns wide. Male genitalia 14.5 microns wide, 8 microns long, the seta 7 microns long.

This Eriophyid was originally described from Western Oregon. Specimens are on hand from Santa Paula, California, July 29, 1937, host *Rhus diversiloba* T. & G. collected by Stewart Lockwood. Also, Sacramento, August 27, 1937, same host, collected by the writer. The mite produces leaf-pocket galls on poison oak, especially on the terminal leaves. These galls are hairy within and are often numerous enough to deform the whole leaf. A photograph with the original description shows the typical work of this mite.

The species is recognized by the shield shape, pattern, and the often strongly microtuberculate tergites.

Phyllocoptes laevigatae Hassan

PLATE XVIII

Hassan, U. C. Publ. in Ent. V. 4, No. 11, p. 379, March, 1928, Fig. M. N.

Female brownish, robust, curved, cone-shaped; 190 microns long, 53 microns wide. Rostrum 28.5 microns long, projecting down. Shield 35 microns long, 42 microns wide, subtriangular, a little produced anteriorly and overlying rostrum base; design netlike fading to side; dorsal tubercles moderately large, 31 microns apart, seta on near rim, the seta 33.5 microns long and projecting backward. Legs rather long and slender. Foreleg 38 microns long; patella 7 microns long, tibia 9.5 microns long, patellar seta 30 microns long; claw 10 microns long, gently curved, knobbed; featherclaw 4-rayed. Second leg 35.5 microns long; patella 6 microns long, tibia 7.5 microns long, patellar seta 14 microns long; claw 10 microns long. The sternal line forked; coxal setae II closer than coxal setae I and before end of sternum fork; coxal setae III 26 microns long. Abdomen with about 44 dorsal half-rings, smooth or microtuberculate, the rings 3.5 microns wide; ventral half-rings about 56, prominently but almost sparsely microtuberculate. Lateral seta a little ahead of genital seta, 21.5 microns long, on ventral half-ring 8. First ventral seta 40 microns long, about ring 22. Second ventral seta 24 microns long, about 36th ring. Third ventral seta 40 microns long, 5 rings from rear. Caudal seta about 80 to 90 microns long; accessory seta very short. Female genitalia 23.5 microns broad, 14 microns long, broadly subcordate; coverflap longitudinally furrowed; glands round, rather small and short-stalked; the seta 26 microns long.

Male not found.

Originally described from *Salix laevigata* Bebb. from Agnew, California. Specimens are on hand from Sacramento, August 18, 1937, collected from the same host by writer. These mites form little bead-like galls in the leaves, open on the underside usually, and hairless. The host, gall-type, and general aspect of this mite indicate it should be referred to *laevigatae*, though somewhat larger. Recognition characters: Netlike shield pattern; irregular doubling of the sternites in relation to the tergites, with many undoubled laterally; ventral microtuberculation. The European *Phyllocoptes reticulatus* Nal., and *aegirinus* Nal. on poplar, *P. magnirostris* Nal., and *parvis* Nal., on willow have this striking shield design, but with the exception of *magnirostris*, none are said to be found in leaf-galls. *Eriophyes tetanothrix* Nal., a willow leaf-gall former, also has this netlike shield pattern.

Phyllocoptes advens Keifer, new sp.

PLATE XIX

Female about 130 microns long, 58 to 60 microns wide, 50 microns deep, rather short, robust, curved cone-shaped. Rostrum 19 microns long and projecting down. Shield broad, subtriangular, 42 microns long, 51 microns wide, a little overhanging rostrum base, disc with some inconspicuous lines, sides smooth; dorsal tubercles moderate size, on the rear margin, 25 microns apart, the setae 19 microns long and projecting backward. Legs moderately slender. Foreleg 33 microns long, patella 5.5 microns long, patellar seta 25 microns long, tibia 9 microns long, claw 6.5 microns long, featherclaw 4-rayed. Second leg 31 microns long, patella 5 microns long, patellar seta 13 microns long, tibia 8 microns long, claw 6.5 microns long. Sternum indistinctly forked, the third coxal seta 36 microns long. Abdomen with 47 to 50 dorsal half-rings, 57 to 58 ventral half-rings, the dorsal half-rings practically smooth, the ventral half-rings microtuberculate. Dorsal half-rings 3.5 microns wide. First lateral seta 21 microns long, about on ring 8, above and a little ahead of the genital seta. First ventral seta 29 microns long, on ring 22. Second ventral 20 microns long on ring 39. Third ventral 34 microns long on 5th ring from rear. Caudal seta about 45 microns long. Accessory seta 3 microns long. Female genitalia broad subcordate, coverflap weakly marked with 5 or 6 furrows; glands rather small, short-stalked; seta about 25 microns long.

Male not seen.

Type slide, so designated, with female mites from Pomona Heights, Los Angeles County, December 13, 1937, from a lemon fruit (under the button), the lemon collected by K. L. Wolff. One paratype slide bears this data; two paratype slides from same host from Pomona lemons (*Citrus limonia* Osb.), the lemons collected December 14 by L. E. Myers. These mites were evidently overwintering and no damage

to the lemon was observed. Lemon is likely not the host on which this mite breeds. *Phyllocoptes advens* is characterized by its almost smooth indistinctly lined shield, the uneven doubling of the sternites as compared to the tergites, and the markings on the coverflap.

This mite was originally thought to be *Paraphytoptus californicus* (Hall) (*Eriophyes*), however further study indicates this to be unlikely. *P. californicus* is said to cause white or pink swellings on one side of the leaf of *Artemisia californica* Less. and when the opportunity occurs these plants will be investigated. An attempt to find *Phyllocoptes advens* on *Artemisia californica* lead to the discovery by L. E. Myers of the mite heretofore described as *Eriophyes spinulifera*. This latter is characterized by the minute skin spinules on the microtubercles.

Phyllocopturta Keifer, new genus

Legs six-jointed, featherclaw simple, anterior coxae contiguous. Shield produced over rostrum base; with setiferous tubercles well ahead of rear margin. Abdomen divided into tergites and sternites by the lateral doubling of the rings as in *Phyllocoptes*; dorsum of abdomen broadly flat or concave, this area tapering and disappearing caudad, and flanked on each side by a subdorsal longitudinal ridge; dorsal half-rings not microtuberculate; ventral half-rings microtuberculate. Setae as found on the usual Eriophyid. Female genitalia with longitudinally furrowed coverflap that entirely covers genitalia.

Genotype: *Typhlodromus oliivorus* Ashm.

Phyllocopturta oleivorus (Ashm.)

(Citrus Rust Mite)

PLATE XX

Ashmead, Can. Ent. V. 11, p. 160, 1879.

Banks, Proc. U. S. N. M. V. 32, p. 621, 1907.

Nalepa, Zoologica, Stuttgart, V. 61, p. 176, 1911.

Essig, Ins. Wn. N. Am. p. 49, 1926.

Nalepa, Marcellia, V. 25, p. 116, 1929.

Yothers and Mason, U. S. D. A., Tech. Bul. No. 176, May, 1930 (bibliography).

Female yellow, cone-shaped, somewhat curved and flattened, 158 microns long, 53 microns wide, 42 microns deep. Rostrum about 26 microns long and projecting downwards. Shield 40.5 microns long, 47 microns wide, subcircular in dorsal view with front somewhat produced and overlying rostrum; shield design standing out sharply giving the shield a very rough appearance from the side; discal pattern of basically two longitudinal lines, curved variously and flanked by curved lines; design fading laterally; setiferous dorsal tubercles moderately large, well ahead of the rear shield margin, 23 microns apart, the setae 9 microns long and projecting dorso-anteriorly. Legs moderately slender. Foreleg 26 to 27 microns long; patella 5.5 microns long, tibia 6.5 microns long, patellar seta 26 microns long; claw 7 microns long, gently curved, knobbed, featherclaw 5-rayed. Hindleg 25 microns long, patella 5 microns long, tibia 6 microns long, the patellar seta 12 microns long, claw 8 microns long. Anterior coxae contiguous, sternal line forked; coxal setae II slightly closer than coxal setae I and at base of sternum fork; coxal setae III 20 microns long. Abdomen as described; about 31 dorsal half-rings and 58 ventral half-rings, the dorsal rings 3.5 microns wide. Lateral seta on about ventral half-ring 5, a little ahead of the genital seta, about 25 microns long. First ventral seta 35 microns long, on ring 17. Second ventral 8 microns long about ring 33. Third ventral about 15 microns long, on fifth ring from rear. Caudal seta nearly 40 microns long; accessory seta very short. Female genitalia 24 microns wide, 14 microns long, bowl-shaped, coverflap longitudinally furrowed; gland short-stalked, small, triangular; seta 16.5 microns long.

Male 135 microns long, 54 microns wide, 47 microns deep. Genitalia 21 microns wide, 12 microns long, seta 14.5 microns long.

This mite was originally described from Florida. Specimens received recently from Lake Alfred, Florida, orange leaves, collected in February, 1938, kindly sent me by W. L. Thompson are identical with those found in San Diego County, California, from which latter the drawings were made. In this state the mite only infests lemons. California specimens are on hand from National City, San Diego

County, August 21, 1937, kindly brought me by J. B. Steinweden; and from Chula Vista, San Diego County, December 4, 1937, W. S. Binney, collector. The drawing of the left side of the female is somewhat disproportionate due to pressure; the mite is actually narrower in side view than in dorsal or ventral view.

To explain the proposal of the generic name *Phyllocoptuta* to accommodate *oleivorus* it is again necessary to refer to *Phyllocoptes carpini* Nal. This latter species has an evenly transversely arched abdominal tergum. The structures on *oleivorus* are fully as distinct from this as those of such genera as *Epitrimerus*. Following Nalepa's 1927 arrangement of the *Phyllocoptinae* the new genus fits in as:

1. Number of tergites (dorsal half-rings) greater than the sternites (ventral half-rings); sternites broad, scalelike, overlapping.....*Phyllocoptyches* Nal.
1. Number of tergites less than the sternites; sternites very small, bearing a row of microtubercles..... 2
2. Legs five-jointed; featherclaw doubled.....*Diptilomiopus* Nal.
2. Legs six-jointed, featherclaw simple..... 3
3. Anterior part of abdomen with tergites and sternites similar; posterior part dissimilar.....*Paraphytoptus* Nal.
3. Abdomen almost entirely with dissimilar tergites and sternites; nearly all tergites broader than the sternites..... 4
4. Tergites bearing rows of recumbent peglike chitinous processes.....*Callyntrotus* Nal.
4. Tergites smooth or microtuberculate..... 5
5. Tergites projecting toothlike laterally.....*Oxypleurites* Nal.
5. Tergites without lateral processes although often slightly overhanging the sternites laterally..... 6
6. Abdomen with a flat or concave middorsal area flanked on each side by a subdorsal ridge, gradually disappearing caudally.....*Phyllocoptuta* new genus.
6. Dorsal side of abdomen regularly or centrally convex..... 7
7. Dorsal side of abdomen, evenly convex..... 8
7. Dorsal side of abdomen with strongly arched, sometimes rooflike middle longitudinal part..... 9
8. Caudal section of abdomen so ringed as to be distinct from the anterior part.....*Anthocoptes* Nal.
8. Caudal part of abdomen not clearly separated from the anterior *Phyllocoptes* Nal.
9. Dorsal side of abdomen with a subdorsal longitudinal furrow on each side, fading out caudally; tergites narrow, often microtuberculate.....*Epitrimerus* Nal.
9. Dorsal side strongly arched, with wide tergites part of which project toothlike along the middorsal line.....*Tegonotus* Nal.

Host List

Pinaceae

- Pinus pinea* L.—*Platyphytoptus sabinianae* n. sp.
Pinus radiata Don—*Eriophyes pini* Nal.
Platyphytoptus sabinianae n. sp.
Pinus sabiniana Dougl.—*Eriophyes pini* Nal.
Platyphytoptus sabinianae n. sp.
Pinus torreyana Parry—*Eriophyes pini* Nal.
Platyphytoptus sabinianae n. sp.
 "Platyphytoptus" *jonesi* n. sp.

Liliaceae

- Tulipa* sp.—*Eriophyes tulipae* n. sp.

Salicaceae

- Salix laevigata* Bebb.—*Phyllocoptes laevigatae* Hassan.

Juglandaceae

- Juglans regia* L.—*Eriophyes tristriatus erineus* Nal.

Rosaceae

- Pyrus communis* L.—*Eriophyes piri* Nal.
Eriobotrya japonica Lindl.—*Eriophyes eriobotryae* n. sp.

Rutaceae

- Citrus limonia* Osb.—*Eriophyes sheldoni* Ewing.
Phyllocoptes advens n. sp.
Phyllocostruta oleivorus Ashm.

Anacardiaceae

- Rhus diversiloba* T. & G.—*Phyllocoptes toxicophaga* Ewing.

Celastraceae

- Euonymus* sp.—*Eriophyes convolvens* Nal.

Cactaceae

- Opuntia* sp.—*Eriophyes cactorum* n. sp.

Oleaceae

- Ligustrum* sp.—*Eriophyes ligustri* n. sp.

Labiatae

- Salvia leucophylla* Greene—*Eriophyes neosalviae* n. sp.

Compositae

- Artemisia californica* Less.—*Eriophyes spinulifera* n. sp.

The type slides of the new species of Eriophyids herein described are deposited in the Entomological Museum of the California Academy of Sciences.

Designations on Plates

- D—Dorsal side of mite.
 DA—Dorsal side of anterior section.
 DS—Dorsal view of shield.
 ED—Detail of dorsal skin.
 ES—Detail of skin on side.
 EV—Detail of ventral skin.
 F—Featherclaw.
 fs—Frontal seta.
 GF—Female genitalia (in one case with the sternal area).
 gl—Genital glands of the female.
 GM—Male genitalia.
 L—Left legs.
 LA—Left foreleg.
 LT—Tarus and associated structures, usually of left foreleg.
 S—Left side of mite, often turned a little ventrad, showing more of dorsum.
 SA—Left side of anterior section more or less turned ventrad.
 SP—Left side of posterior section of mite, often turned dorsad.
 V—Ventral view of mite.

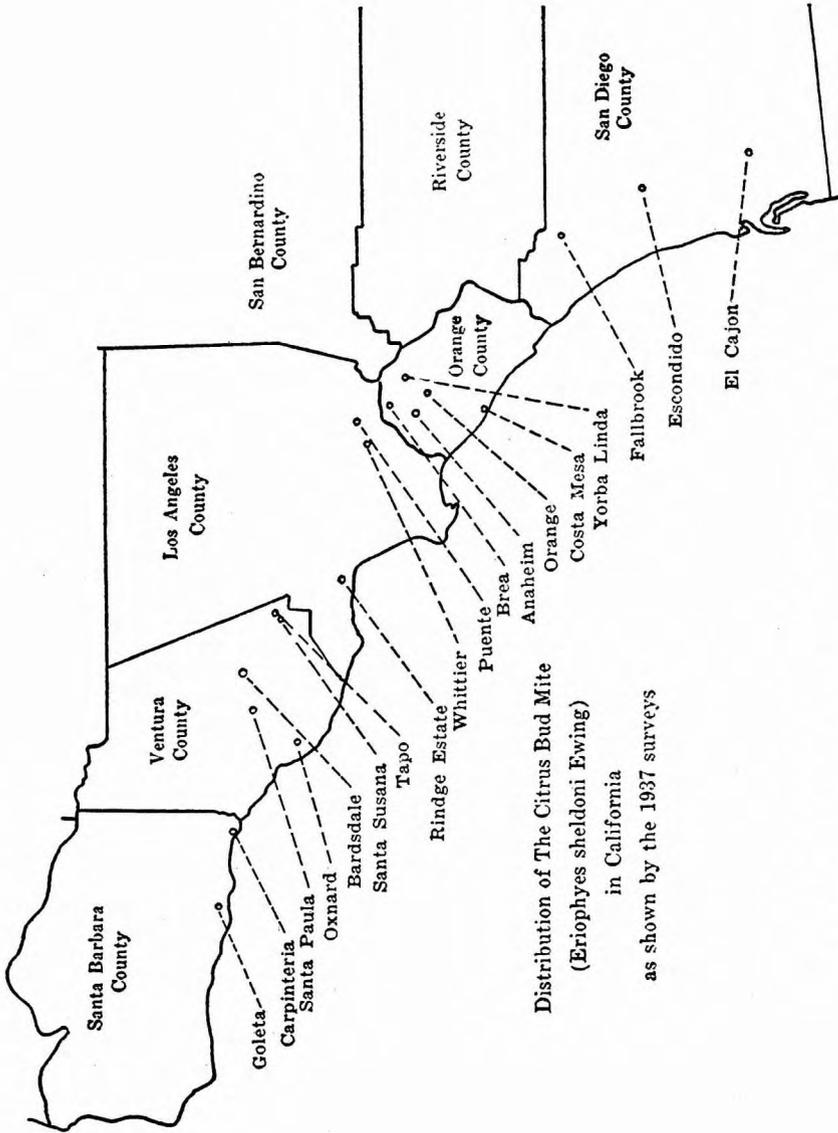


Plate I—Map showing known distribution of *Eriophyes sheldoni* in California.

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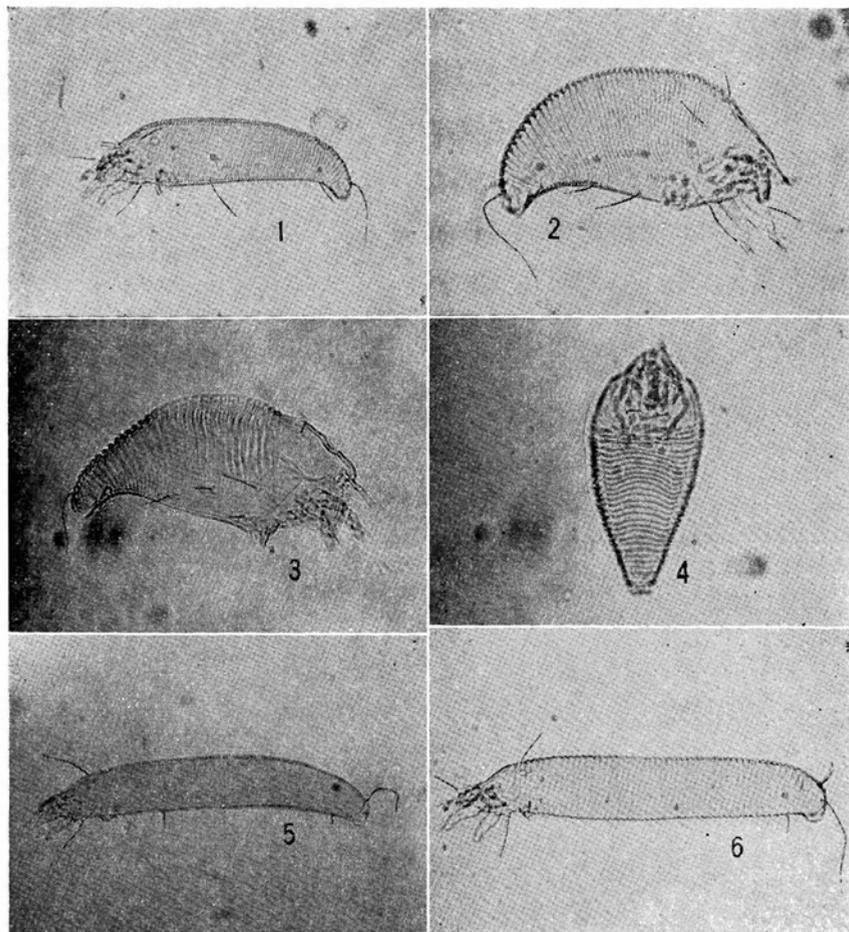


Plate II—Photographs of mites. (By C. Clower)

- FIG. 1. *Eriophyes sheldoni* Ewing, female, left side.
 FIG. 2. *Phyllocoptes advens*, female, right side.
 FIG. 3. *Phyllocoptruta oleivorus* (Ashm.), female, right side.
 FIG. 4. *Phyllocoptruta oleivorus* (Ashm.), male, dorsal side.
 FIG. 5. *Eriophyes piri* (Pgst.), female, left side.
 FIG. 6. *Eriophyes tristriatus erineus* Nal., female, left side.

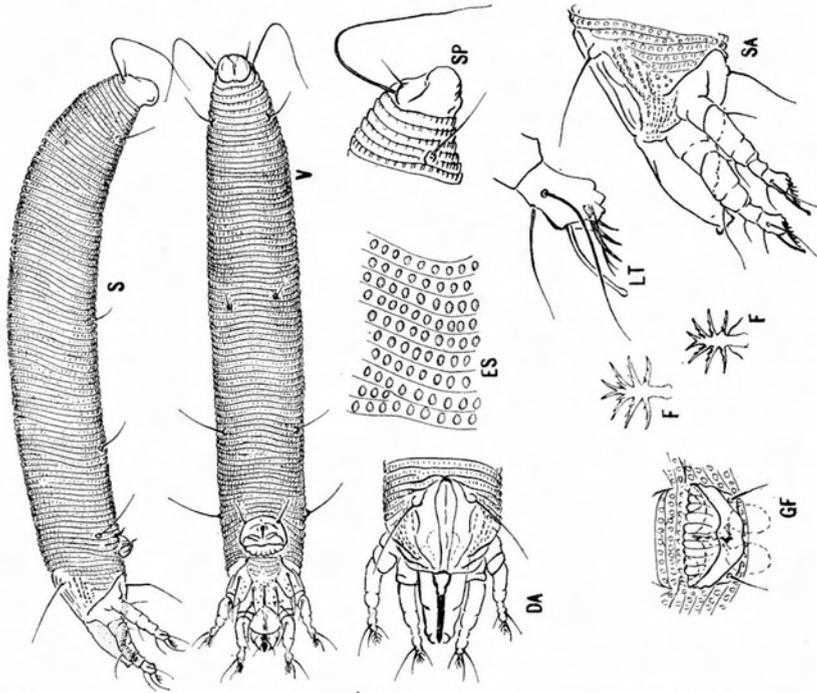


Plate IV.—*Eriophyes piri* (Pgst.)

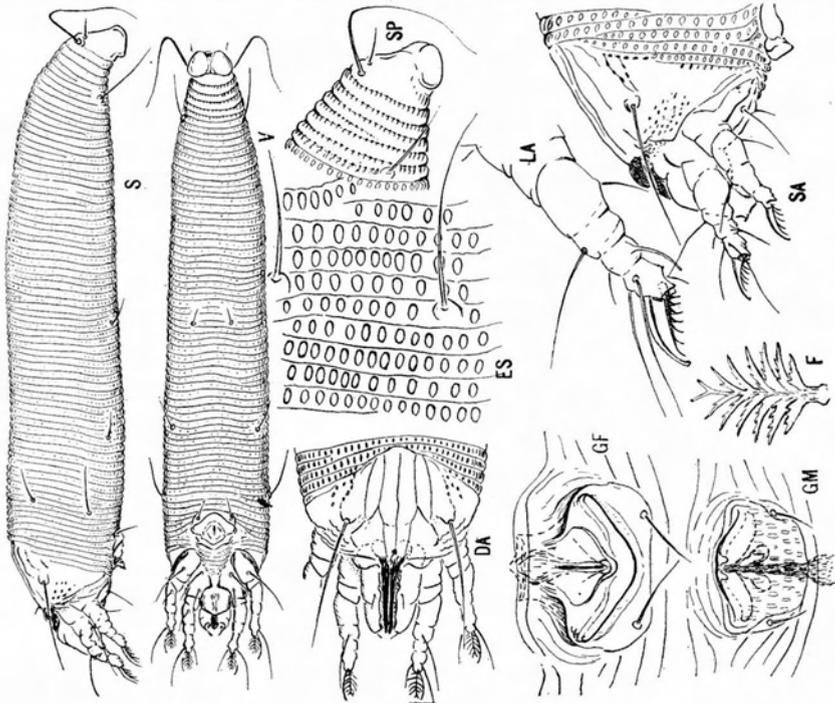
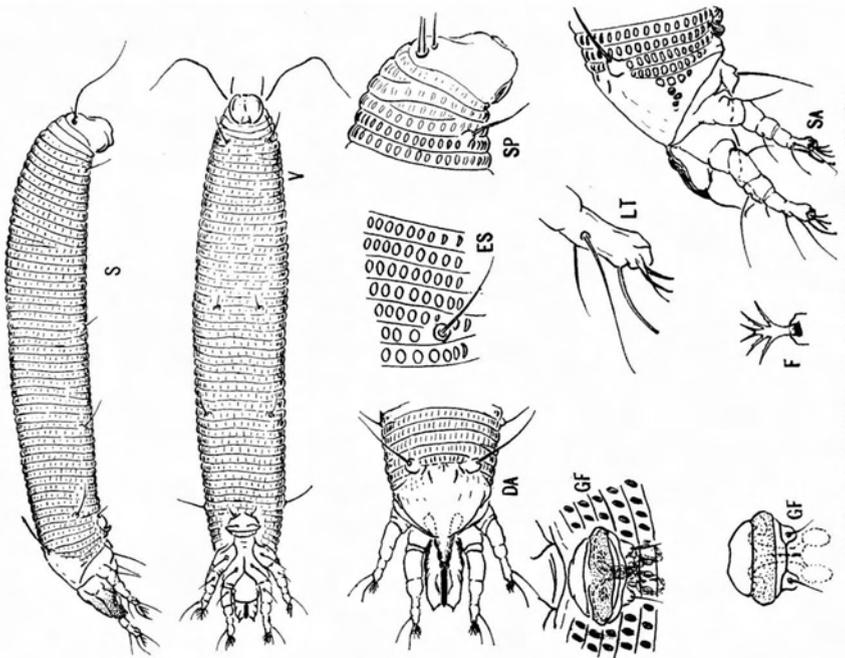
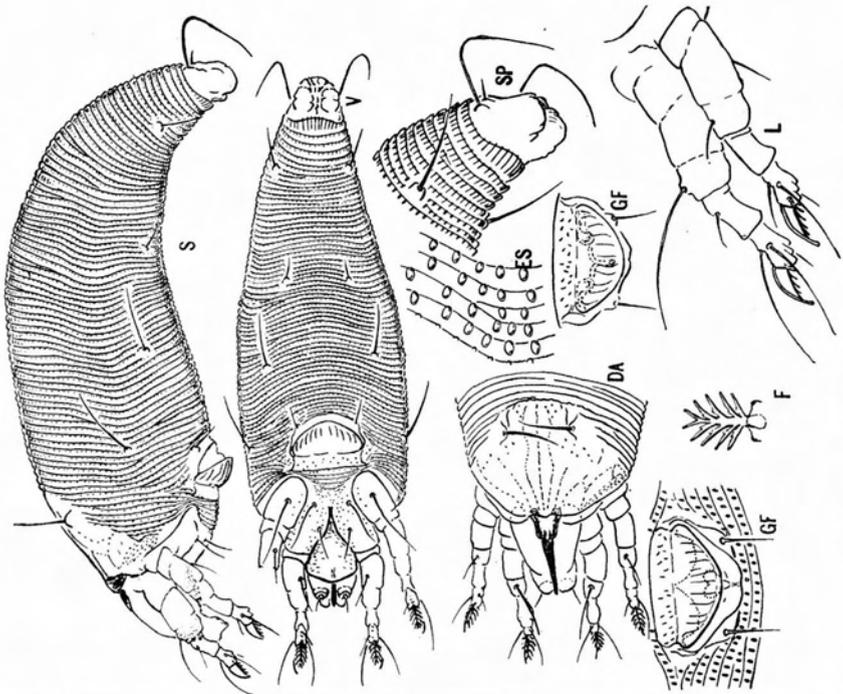


Plate III.—*Eriophyes pini* (Nal.)



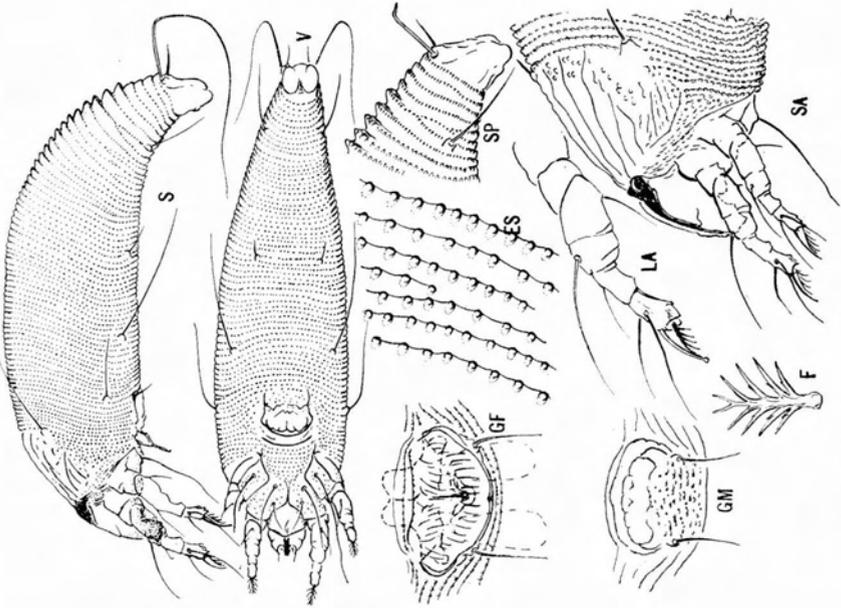


Plate VIII—*Eriophyes cactorum* n. sp.

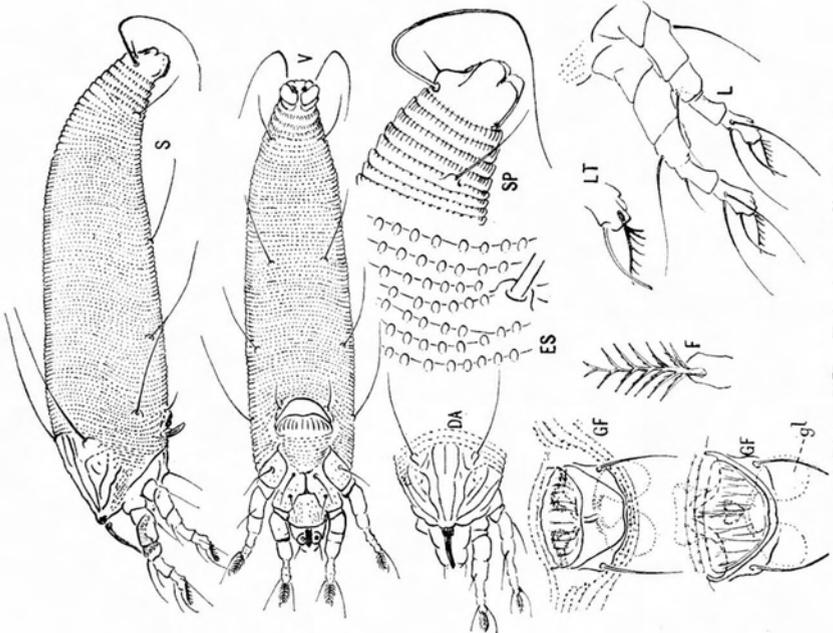


Plate VII—*Eriophyes tulipae* n. sp.

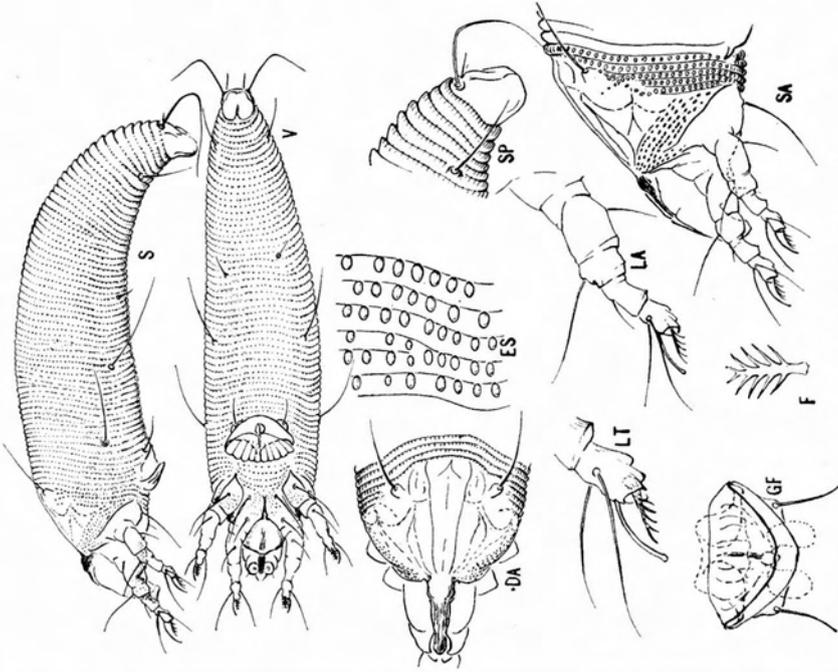


Plate X—*Eriophyes sheldoni* Ewing
(From Orange County material)

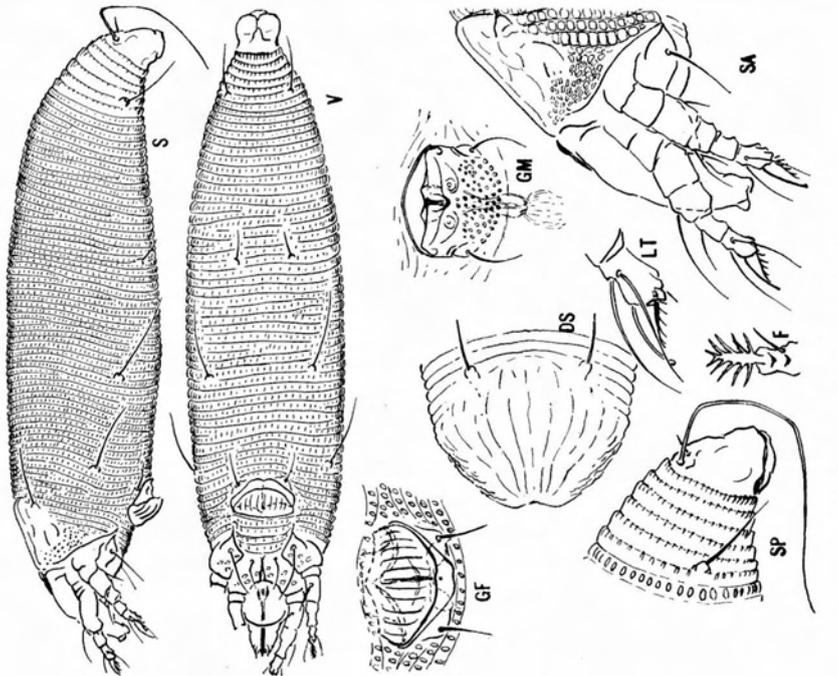


Plate IX—*Eriophyes sheldoni* Ewing
(From Santa Paula material)

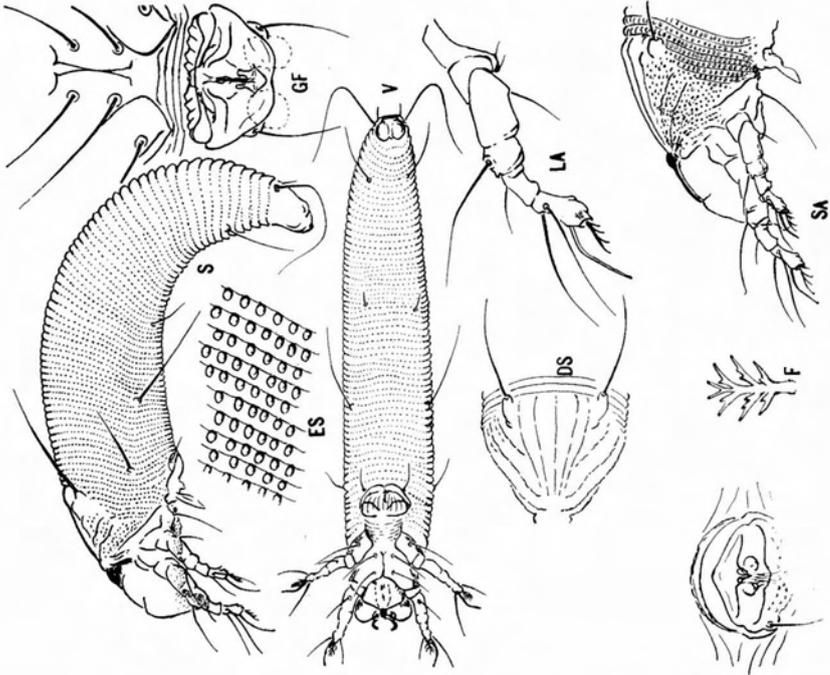


Plate XII—*Eriophyes neoscutatae* n. sp.

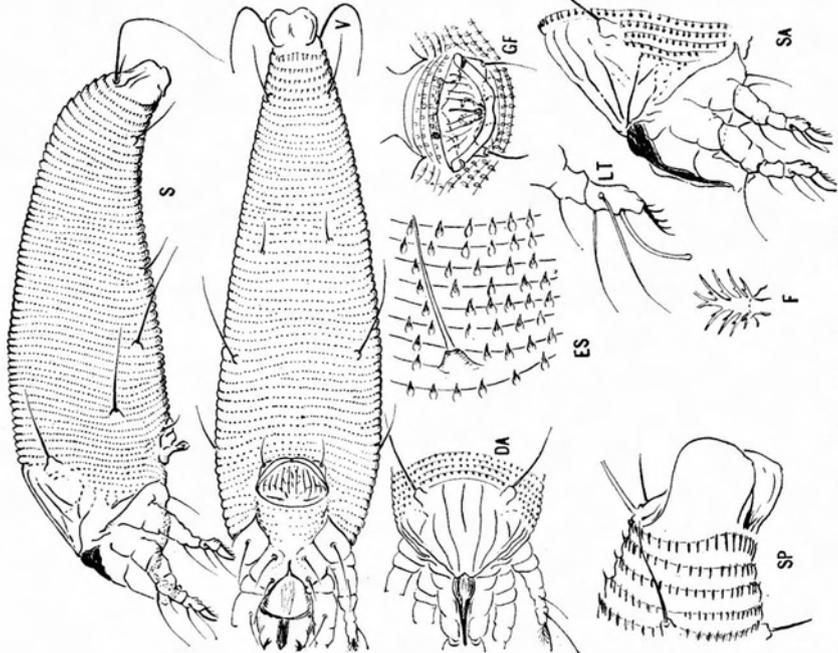


Plate XI—*Eriophyes spinulifera* n. sp.

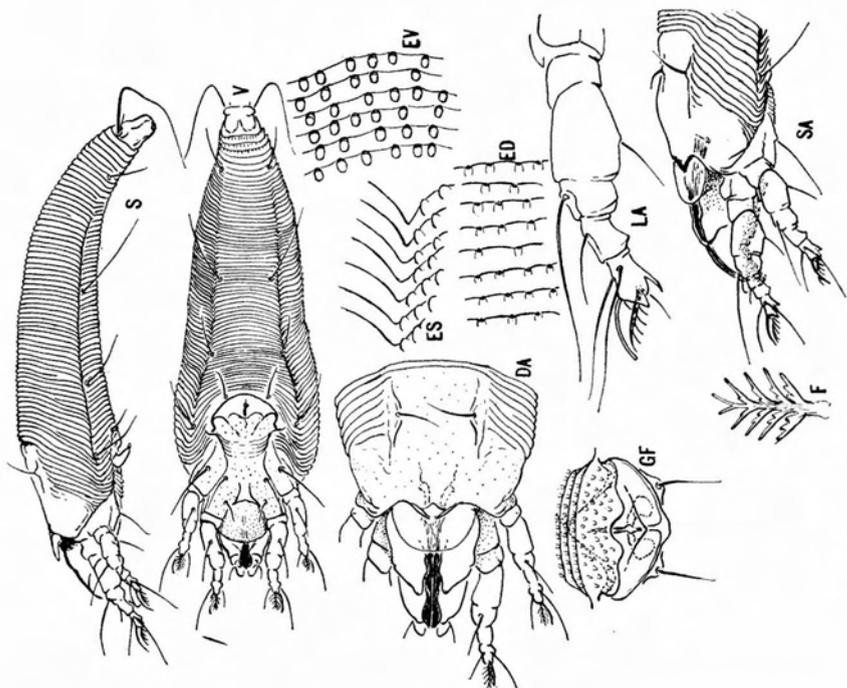


Plate XIV—*Platyphytoptus sabinianae* n. sp.

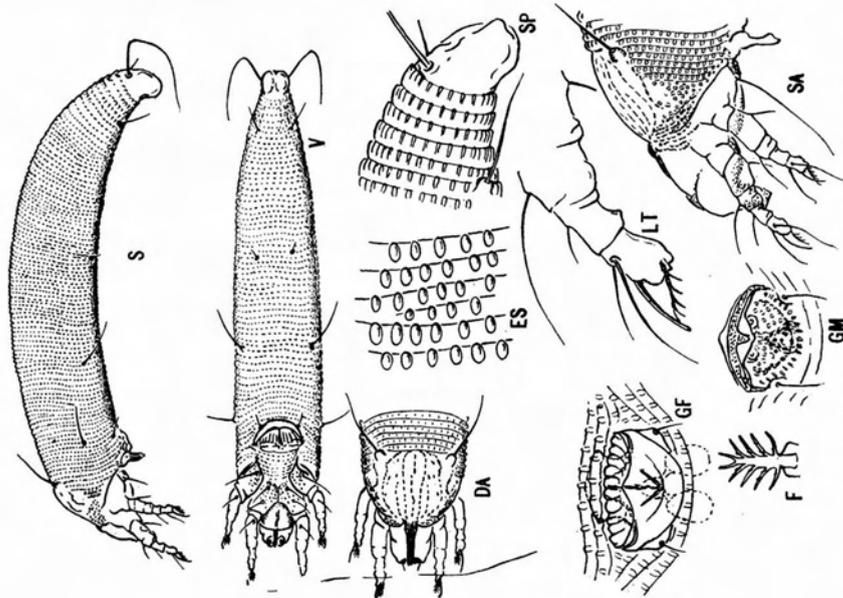


Plate XIII—*Eriophyes eriobotryae* n. sp.

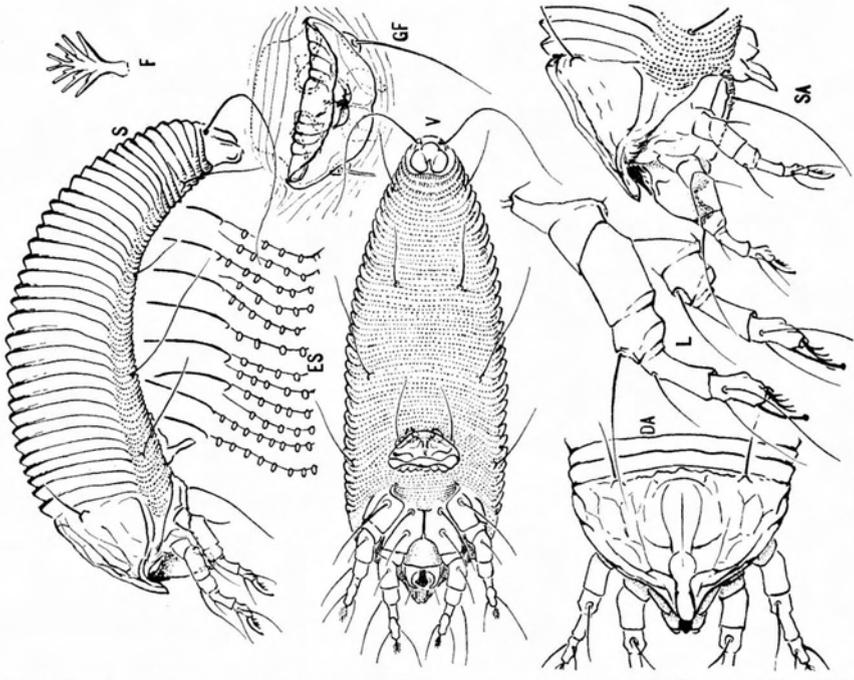


Plate XVI—*Phyllocoptes lignistri* n. sp.

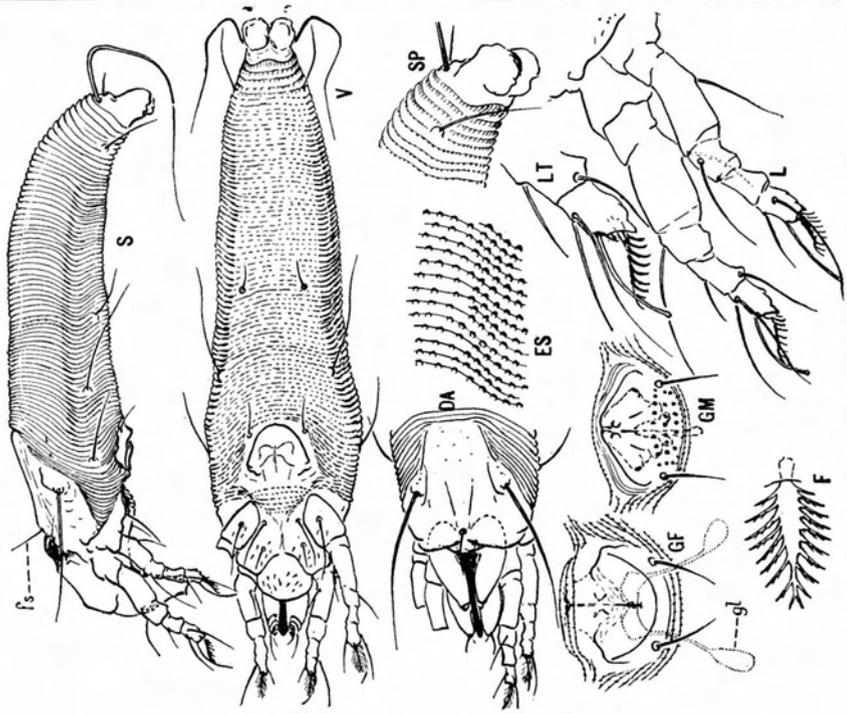


Plate XV—*Platyphoptus jonesi* n. sp.

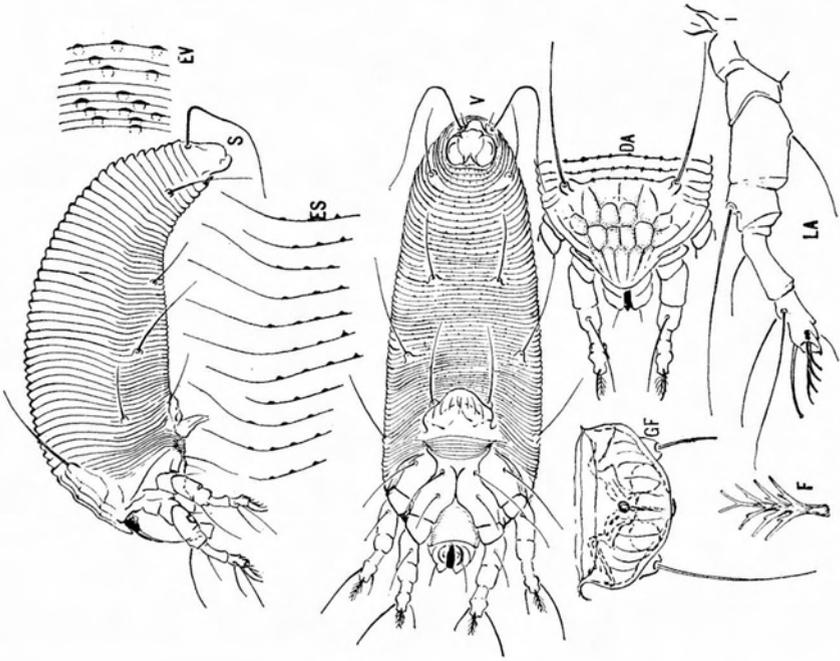


Plate XVIII—*Phyllocoptes laevigatae* Hassan

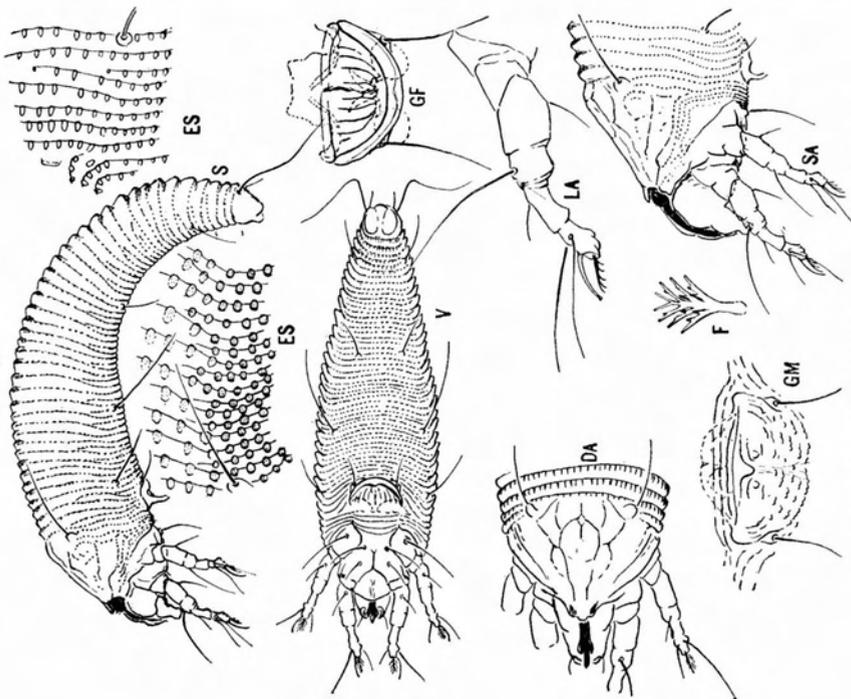


Plate XVII—*Phyllocoptes toricophagus* Ewing

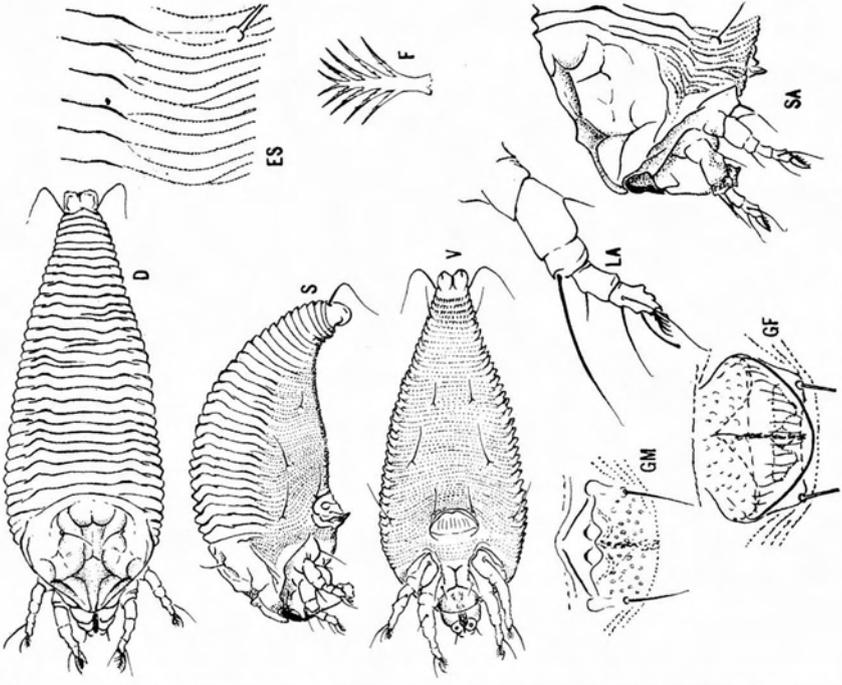


Plate XX—*Phyllocoptera oleivorus* (Ashm.)

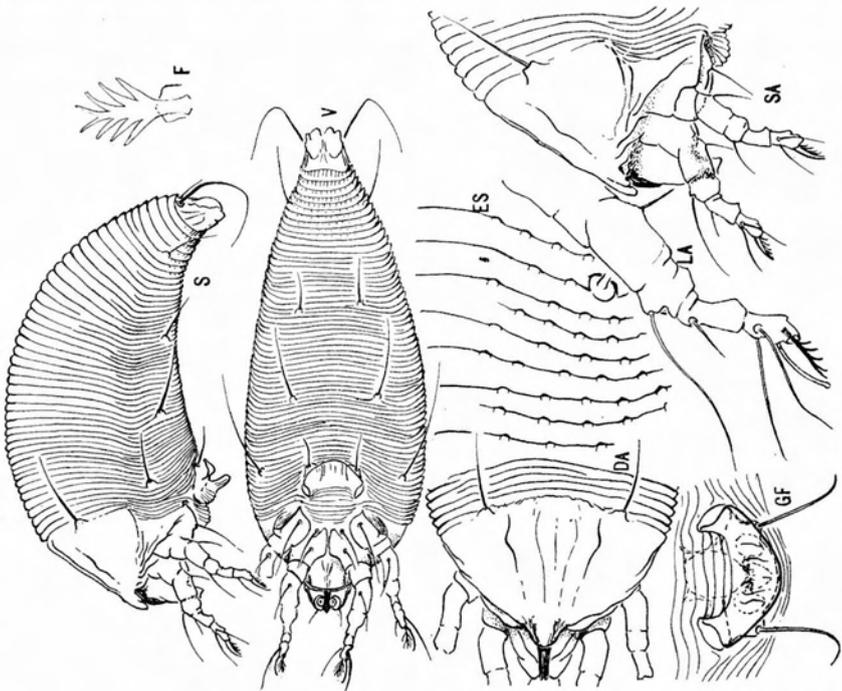


Plate XIX—*Phyllocoptes advens* n. sp.